The "miracle sky hook"

by A. D. TAYLOR, G8PG*

A support that will raise one end of an antenna to between 70 and 110ft, that can be erected by one man in a couple of minutes, and that only costs a few pence, sounds like a pipe dream. Actually such a support is easy to make. It takes the form of our old friend the kite. Originally used by Marconi for his first reception of transatlantic radio signals, the kite-supported antenna seems to be largely overlooked by the present generation of hf band operators. This is a pity, as modern materials make kites very easy to construct, and give better performance than some of the heavier materials previously used. This can be said with some confidence—a few months ago G8PG had never built or seriously flown a kite, but now his home-made models fly extremely well. If a kite is to support an antenna successfully it must be very stable in flight, thus allowing long periods of "hands off" flying, and it must have a good lifting capability. After various experiments, a design which meets these requirements has been evolved. It is simple and inexpensive to make.

Construction

The kite used is a square kite, flown with two corners in the vertical plane and two in the horizontal plane (Fig 1). It is made from part of one of the polythene bags used to collect the waste in a kitchen pedal bin, four of the so-called "18in garden canes" obtainable from multiple stores, and a small fishing hook swivel (the swivel isolates the kite from the twisting motion of the nylon kite line). Sellotape, plastic insulating tape and string will also be required during construction. One pedal bin liner bag should provide enough material to make two kites.

The method of construction is as follows. Lay two of the garden canes side by side and adjust the overlap until the total length is 24in. Using Sellotape, bind the two canes tightly together along the whole length of the overlap. Repeat the process, but now using the second pair of canes. Carefully measure out and mark the exact centre point of each pair of canes.

Make a cut down one side of the pedal-bin bag, then carefully open up the bottom, which is closed by means of plastic adhesive. The result will be a large sheet of plastic. Lay one pair of canes on the centre line of this sheet, with one end level with the bottom. Secure each end of the canes firmly in place by means of a piece of Sellotape. Lay the second pair of canes over the first and exactly at right-angles to them, and carefully align the previously marked centre points. Fix the ends of the second pair of canes firmly in place with Sellotape. With a pair of scissors, accurately cut away all excess plastic until the square shape shown in Figure 1 is obtained. Put more Sellotape over the four ends of the canes until they are firmly fixed to the plastic material, then further strengthen the joints with a piece of plastic insulating tape. Note that the kite is not collapsible—it is permanently assembled and is transported by laying it on top of the luggage in the boot of a car.

Balance the centre point, where the two pairs of cane cross, on a finger. If the kite is not balanced move the point at which

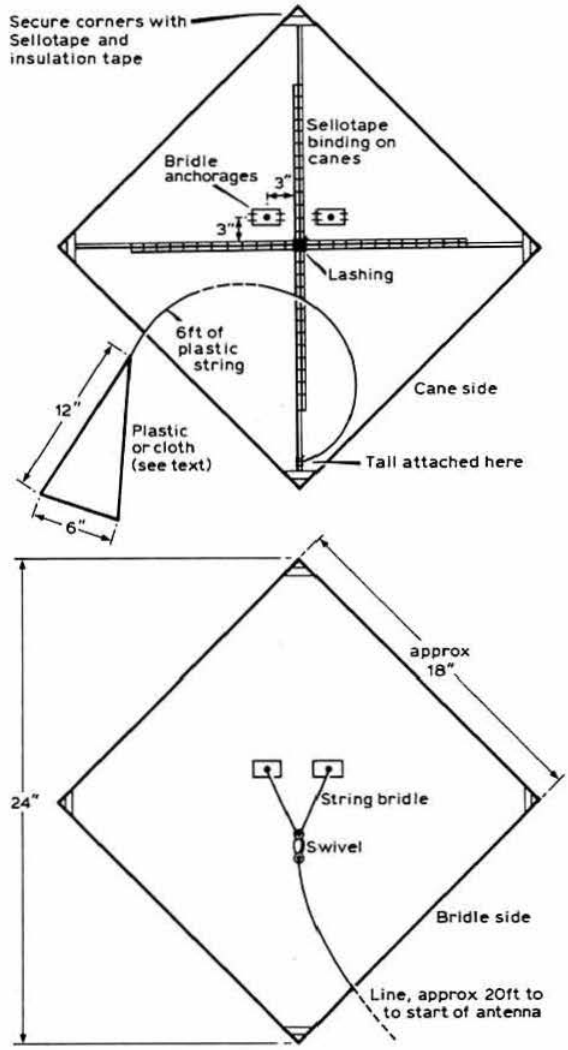

Fig 1. Construction

the two pairs of canes cross until balance is achieved, then lash the two pairs of canes together at this point with thin string.

To make the bridle, measure a point 3in above one pair of canes and 3in to the left of the second pair of canes. Fix a 1in length of insulating tape to each side of the plastic at this point. Make a small hole through the insulating tape and plastic at the point where the 3in guidelines cross. Do the same thing again, but this time at a point 3in to the right of the second pair of canes. Pass one end of a length of thin string through one of the holes, tie it to a pair of spent matchsticks, then pull the matchsticks up to the surface of the kite and fix them in position with insulating tape. Slip the fishing swivel over the free end of the string, pass the free end through the second hole in the kite, and adjust the length of the string to produce a V with its apex 4in from the surface of the kite. Position the swivel at the apex of the V and secure it in place by putting a couple of turns of copper wire around the string. Secure the free end of

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the string by means of matchsticks and insulating tape as already described. The kite is then complete. Assembly only takes a few minutes and the cost of materials is about 6p.

The line/antenna

The 150ft line used with the kite is made from the so-called "stunt kite line" available from toy shops; this is a very light nylon line, usually sold in 100ft lengths. The small plastic winders supplied with these lines are not suitable for antenna work, so when the line/antenna has been made it should be wound onto a piece of board 8 by 6in with slots 1in deep and 4in wide cut in the narrower ends. As the weight-lifting capacity of a kite is limited, the antenna suggested consists of 130ft of 28swg enamelled copper wire, plus a short lead-in. Experience by other operators using "invisible" antennas shows that this gauge can handle up to 150W.

To make up the antenna, reel off 135ft of kite line and fix it firmly between two supports, such as spades, driven into the ground. Clean 1in or so at one end of a reel of 28swg wire and solder 4ft of light, flexible, insulated wire to it. Attach the joint firmly to the kite line, 4ft from one end, by tying it on with thin string and then taping it in place. Keeping both kite line and wire under tension, reel off a further 10ft of wire and tie to the line at the end of the 10ft section, using thin string. Repeat this every 10ft until 130ft of wire has been reeled out. Cut the wire and secure the end of the last 10ft section to the line by twisting the last 2in round the line and taping them in place. The line/antenna is then wound on to the winding board, starting at the lead-in end.

In tests so far made, this antenna has been worked against a counterpoise consisting of the chassis of a saloon car. Coupling to the transmitter has been with the aid of the coupler shown in Fig 2. Components L1, C1 are chosen to resonate at the desired operating frequency, tap T1 is adjusted to provide a good match to the transmitter output, and tap T2 is adjusted to provide maximum rf into the antenna.

One point is worth stressing. Even in breezy weather the wind does occasionally die away for a minute or so, and this may allow the kite to sink gently to earth. If QRO equipment is being used to excite the antenna this might cause a mismatch at the transmitter output, so to avoid any possibility of damage it is suggested that QRO equipment be run at not more than 75 per cent of its rated power when attached to a kite antenna. No problems have arisen when using QRP all-transistor equipment.

Flying the kite

Before attempting to fly a kite, the following safety precautions should be noted:

(1) Never fly a kite where it can fall on power lines, telephone lines, roads, people or animals.

(2) Never fly a kite if there is a possibility of lightning in the area.

(3) Never fly a kite above 200ft (unless special permission has been obtained).

To prepare the kite for flying, tie the end of the line to the free ring on the swivel, and tie on the tail at the point indicated in Fig 1. If the wind is strong, tie one or more additional pieces of cloth on to the tail. Lay the kite flat on the ground, reel off about 60ft of line/antenna, and weigh down the winding board with a heavy stone. Return to the kite, stand back to wind, hold the line loosely in one hand, and launch the kite with the other hand. Move back quickly, paying out line until the antenna

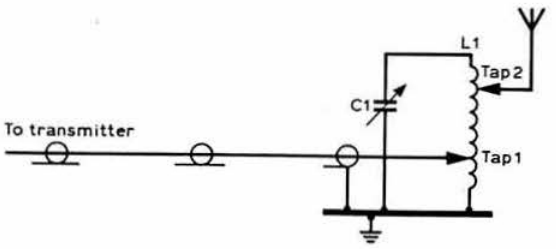

Fig 2. Coupling circuit

reaches a reasonable height, then move back to the winding board and pay out the remainder of the line/antenna.

If the kite is stable but rises sluggishly and then stops rising, take weight off the tail. If the kite takes up a position horizontal to the ground and then falls, try additional weight on the tail, and if this does not give a complete cure slightly shorten the bridle by moving the position of the wire binding. If the kite rises well but side-slips violently to earth, slightly adjust the position of the point at which the two sets of canes cross (by moving the lashing in the horizontal plane) until the instability is cured. Time spent in careful adjustment is repaid by the ability of the kite to fly "hands off" for two or three hours at a time. Once the antenna has been paid out, the bottom of the line/antenna should be secured to a suitable anchor at the point where the lead-in is attached. A small garden fork driven into the ground makes an excellent anchor.

Test results

Tests carried out from GW8PG/P used a 3W transistor cw transmitter to excite the antenna on the 14, 7 and 3·5MHz bands. Despite poor summer daylight conditions, excellent results were obtained. One 30min session on 14MHz produced contacts with seven European countries in an arc from Sweden to Spain, indicating that, even though there is some slope on the antenna, it is still largely omni-directional. On 7MHz all of western Europe was worked, and on 3·5MHz a distance of 250 miles was worked at mid-day. The advantages of a high antenna and an absolutely quiet location were also very apparent when receiving; QRP (3 to 9W) stations in seven European countries being both heard and contacted. Indeed it is not until one goes to a really quiet location that one can appreciate the unbelievable level of electronic environmental pollution that exists in most urban areas. □

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